RAPID COMMUNICATION

Detection and treatment of synchronous lesions in colorectal cancer: The clinical implication of perioperative colonoscopy

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Abstract

AIM: To evaluate the clinical significance of pre- and intra-operative colonoscopy for the detection of synchronous lesions in colon cancer.

METHODS: Two hundred and sixty-five pre-operative and 51 intra-operative colonoscopic evaluations were performed in 316 colorectal cancer patients who underwent curative resection from January 2001 to June 2006. The incidence and characteristics of synchronous lesions and their influence on surgery were evaluated.

RESULTS: Two hundred and eighty-two synchronous lesions were detected in 124 (39.2%) of 316 patients including all lesions regardless of their histologic type. True adenomatous polyps were found in 91 (28.8%) of 316 patients, and 17 (5.4% of all patients) patients had synchronous colon cancers. The preoperative identification of synchronous lesions altered the planned surgery in 37 (14.0%) of 265 patients. In 18 patients among the surgically removed cases, the lesions were removed by extending the resection range. Further segmental resection or polypectomy through enterotomy was necessary in 19 patients. Nineteen (37.2%) of 51 intraoperative colonoscopy cases had synchronous lesions. Additional surgical procedures including segmental bowel resection and polypectomy with enterotomy were necessary in 7 (13.7%) of 51 intraoperative colonoscopy cases to remove the lesions.

CONCLUSION: Synchronous colorectal polyps or cancer are frequent and their preoperative detection is important for optimal surgical planning and treatment. Intraoperative colonoscopy is a useful option in cases where a preoperative colonoscopy is not feasible.

INTRODUCTION

The association of synchronous adenomatous polyps in colon cancer has been reported to be 15%-50% and synchronous cancer as high as 2%-10%[1-4]. A routine preoperative colonoscopy has been recommended for patients diagnosed with colorectal cancer in order to identify synchronous polyps and/or cancer, that otherwise might have remained undetected at the time of the surgery[5]. The identified lesions can be removed endoscopically or by surgery.

Despite its importance, a preoperative colonoscopy of the entire colon is often unobtainable due to bowel obstruction by the tumor, poor bowel preparation or limitations associated with available facilities. Several authors have shown the usefulness of intraoperative colonoscopy when a preoperative colonoscopy was not possible[6,7]. The detection of synchronous tumors by intraoperative colonoscopy often alters the planned surgery. However, not all investigators agree on the effectiveness of intraoperative colonoscopy. Among the concerns reported are the increased surgical time and possible risk of infection[8].

The prevalence of colon cancer and polyps differ widely by race and geographic location. The clinical significance of synchronous polyps or cancer may be different based on these epidemiologic factors. Most prior studies on perioperative colonoscopy have been performed in Western countries; there are only a limited number of reports in Asia[9,10]. The present study was performed to evaluate the status of synchronous colon cancer in Korea and efficacy of perioperative colonoscopy.

MATERIALS AND METHODS

From January 2001 to June 2006, 324 consecutive surgeries for colorectal cancer, with intent-to-cure, were performed

Table 1 Distribution of primary carcinoma by stage (TNM stage) and site

Site	Stage				
	I	II	III	IV	Total
Ascending colon	16	22	16	3	57
Transverse colon	5	6	8	2	21
Descending colon	3	6	5	1	15
Sigmoid colon	22	27	43	3	95
Rectum	32	37	54	5	128
Total	78	98	126	14	316

Table 2 Characteristics of synchronous lesions

Characteristics	Number of lesions	%
Location of polyps		
Ascending colon	48	17.0
Transverse colon	39	13.8
Descending colon	18	6.4
Sigmoid colon	93	33.0
Rectum	84	29.8
Size of polyp (mm)		
< 5	77	27.3
5-10	109	38.7
10-15	56	19.8
15-20	23	8.2
> 20	17	6.0
Histology		
Carcinoma	19	6.7
Adenomatous polyp	158	56.0
Tubular	93	
Villo-tubular	37	
Villous	28	
Hyperplastic polyp	78	27.7
Others	27	9.6
Total number of polyps	282	100

at the Ilsanpaik Hospital.

A complete preoperative colonoscopy is a standard part of patient evaluation prior to surgery at this hospital. Intraoperative colonoscopy was performed when a preoperative colonoscopy was impossible or incomplete. The most common cause of failure of a preoperative colonoscopy was luminal narrowing by a tumor. The use of a bowel stent (Wallstent™, Boston Scientific, USA) often enabled preoperative bowel preparation in obstructed cancer and made elective surgery possible. Patients were placed in the lithotomy position if an intraoperative colonoscopy was anticipated. The surgeon performed the colonoscopy. Intra-abdominal hand guidance by an assistant surgeon made scope insertion easy. A noncrushing bowel clamp was applied at the terminal ileum to prevent gaseous distention of the small bowel, which is frequently encountered during the procedure. The intraoperative colonoscopy was performed after on-table bowel cleansing, when a preoperative stent insertion was impossible or an emergency operation was necessary. Intraoperative bowel cleansing was achieved with saline infusion through a Foley catheter inserted through the appendiceal stump as previously reported[11]. The solid fecal residue was irrigated from the proximal colon and drained through an anesthetic scavenger tube that was connected to the distal colon. The colonoscopy was performed just after bowel anastomosis. Fifty-one intraoperative colonoscopy examinations were performed, and the synchronous lesions detected were removed by colonoscopic polypectomy or by a surgical approach depending on the size and features of the lesion.

Out of the 324 consecutive patients, 8 patients whose first colonoscopy evaluation was done postoperatively were excluded and the data on the remaining 316 patients (202 males and 114 females, mean age 61.5 ± 12.1 years) were analyzed. The location and pathologic stage of primary cancers in these 316 patients are given in Table 1. All the procedures, particularly the intraoperative bowel cleansing and colonoscopy, were performed with the written consent of the patients or their guardians.

RESULTS

Characteristics of synchronous lesions

Two hundred and eighty-two synchronous lesions, including polyps and carcinoma, were detected in 124 (39.2%) of 316 patients enrolled in the present study. All lesions, regardless of their histological type, were included.

Multiple lesions were common. Forty-four patients had only one lesion but 48 patients had two or three, 28 patients had 4-10, and four patients had more than 10 lesions. The average number of lesions per patient was 2.3. Adenomatous polyps were the most frequent histological type and hyperplastic polyps were the second most common. True adenomatous polyps were present in 91 (28.8%) of 316 patients (Table 2). Nineteen synchronous colon cancers were detected in 17 (5.4%) patients in the study population. The invasion depth of the synchronous cancer was mostly confined to the mucosa or submucosa. Fifteen tumors were mucosal or submucosal tumors, three tumors invaded muscle and four tumors invaded beyond the muscle layer.

Treatment of synchronous lesions detected at preoperative colonoscopy

Synchronous polyps were detected in 105 (39.6%) of 265 patients who underwent preoperative colonoscopy. Removal of the polyps detected at the preoperative colonoscopy was attempted by endoscopic modalities where technically feasible. Surgical removal was preferred if the polyp was close to the primary tumor or if the endoscopic removal was technically difficult. Another indication for surgical removal was an unfavorable histopathologic finding of the endoscopic polypectomized specimen.

One hundred and fifty-six lesions were removed from 77 patients by preoperative colonoscopic polypectomies. Ninety-nine lesions from 37 patients were surgically removed. Among them, 51 polyps in 18 patients were included in the surgical specimen. An extended resection was often necessary for the inclusion of polyps within specimen. A tattooing with indigocanine during the colonoscopy was helpful for determining the extent of the resection. Fifteen polyps in 10 patients were removed by polypectomy through enterotomy. An additional bowel

Table 3 Treatment of synchronous lesions		
	No. of patients with synchronous lesions	No. of lesions
Preoperative colonoscopy cases (n = 265)	105[1]	255
Preoperative polypectomy	77	156
Surgical removal	37	99
Included within specimen	18	51
Segmental resection	6	12
Enterotomy/wedge resection	10	15
Subtotal colectomy	3	21
Intraoperative colonoscopy cases (n = 51)	19	33
Endoscopic polypectomy	5	7
Surgical removal	7	13
Segmental resection	3	7
Enterotomy	4	6
Included within specimen[2]	7	13
Total	124	282

[1]Dual procedure were performed for some patients, therefore, the sum exceeds the total number of patients. [2]These lesions were not recognized until postoperative specimen examination.

resection was necessary in six cases and subtotal colectomy was performed in three cases (Table 3).

Treatment of synchronous lesions detected at intraoperative colonoscopy

Fifty-one intraoperative colonoscopies were performed. The most frequent indication was the evaluation of the remainder of the colon when a segmental resection was performed in obstructed left side colon cancers. Out of 36 obstructed left colon cancer patients, preoperative bowel preparation was possible in 15 patients without the aid of a stent although the colon lumen was so narrowed that the colonoscope could not pass the lesion site. A colon stent was inserted in 12 of 36 patients for bowel cleansing. Intraoperative colonoscopy was performed after bowel anastomosis. Colonoscopy was performed after on-table colon lavage and bowel anastomosis in nine patients whose bowel preparation was not previously possible at all.

Preoperative colonoscopies were not done or were incomplete in nine patients who had causes other than bowel stenosis. These nine patients and six other patients whose lesion site was unclear at laparotomy accounted for additional cases that needed intraoperative colonoscopy. An average of 10.5 min was required for the intraoperative colonscopy except when a polypectomy was performed.

Twenty synchronous cancers or clinically significant polyps were present in 12 (23.5%) of 51 patients who underwent intraoperative colonoscopy. Seven lesions from five patients were removed using an endoscopic snare. Three patients underwent further segmental colon resection and the polyp was removed through enterotomy in four patients. The seven resected specimens included 13 more lesions, which were not recognized until postoperative specimen examination. The results of this study showed that intraoperative colonoscopy does not significantly increase complication rates although a statistical comparison was impossible due to the limited case number (Table 4).

Table 4 Incidence of complications	
Time of colonoscopies	Number of patients (%)
Preoperative colonoscopy (n = 265)	
Anastomosis leakage	4 (1.5)
Intraabdominal sepsis	3 (1.1)
Wound infection	7 (2.6)
Intraoperative colonoscopy with bowel preparation (n = 42)	
Anastomosis leakage	1 (2.4)
Intraabdominal sepsis	1 (2.4)
Wound infection	3 (4.7)
Intraoperative colonoscopy with intraoperative colon lavage (n = 9)	
Anastomosis leakage	0
Intraabdominal sepsis	0
Wound infection	2

DISCUSSION

The prognosis of colon cancer has improved with advances in early detection. However, a large number of patients with colorectal cancer still die from the recurred disease after surgery[12]. Overlooked synchronous lesions may adversely affect patient prognosis although local recurrence and distant metastases are the most common causes of treatment failure.

The results of this study showed the usefulness of pre- and intra-operative colonoscopy. The incidence of observed synchronous adenomatous polyps (28.8%) and carcinoma (5.4%) was consistent with pervious studies[3,4]. Ninety-four lesions were neoplastic tumors greater than 10 mm and thus of significant malignant potential. These findings suggest that a colonoscopy is essential at surgery in patients with colon cancer.

A preoperative colonoscopy is ideal in that it allows for surgical planning for the synchronous lesions when present. However, a preoperative colonoscopy is often impossible due to bowel obstruction. Given the necessity of a perioperative colonoscopy, the consequence of an unsuccessful preoperative procedure is to repeat the examination soon after operation. In order to avoid multiple invasive and expensive investigations, Barlow et al[13], proposed performing colonoscopy only after surgery when the colonoscopy is more likely to be successful, with a reported failure rate of 10%. However, this policy may increase the risk for additional surgeries.

In our experience, modification of the standard resection was required in 25 of 105 patients who had polyps detected at the preoperative colonoscopy. Considering the lack of sensitivity of operative palpation, it is possible that some of these 25 patients would have required reoperation if the preoperative colonoscopy had not been performed. The avoidance of additional operations is a powerful argument for a preoperative colonoscopy. In our view, a preoperative colonoscopy should be routinely done whenever possible. After the colonoscopy and curative resection, the follow-up would begin with a patient assumed to have a clean colon.

It has been reported that a preoperative colonoscopy was not possible in as many as 50% of cases although our study shows a lower rate[13,14]. Tumor stenosis of the

colon was the most frequent cause of not being able to do a preoperative colonoscopy. Considering the importance of precise information on synchronous lesions at colon cancer surgery, intraoperative colonoscopy is an attractive option. Preoperative bowel preparation was possible with or without the aid of a bowel stent in 27 of 36 cases of obstructed colon cancer patients in this study. An intraoperative colonoscopy could be done without much difficulty in a cleaned colon with the limited additional labor needed for preparation of the endoscopic device. The procedure added only 10 min of operation time, but the results were significant. We encountered synchronous lesions in 19 (37.2%) of 51 intraoperative colonoscopy cases and performed appropriate treatment for each including seven surgical removals.

The insertion of a stenting device is not always possible despite its usefulness in obstructed left side colon cancer. There are several surgical options when all of the trials for preoperative bowel preparation fail. The traditional treatment is a two-stage Hartmann procedure[15]. Single stage procedures have also been tried with reports of positive results in most cases[11,16-17]. A subtotal colectomy and the standard bowel resection, after an on-table bowel preparation with antegrade colonic irrigation, are the two most popular procedures. There are claims that primary resection with on-table bowel preparation is a better approach in terms of risk and cost compared to the two-stage procedure, and is superior to the subtotal colectomy in the long-term functional outcome[18]. However, the procedure has the disadvantage that the surgeon does not know the status of synchronous lesions in addition to the risk of wound contamination. In our experience, intraoperative colonoscopy effectively solved this problem. Colonoscopy was possible in all cases with intraoperative bowel preparation although the case number was limited. Recently introduced devices for colonic irrigation may facilitate the procedure although we have no experience with them[19].

There is a report that follow-up colonoscopy detects metachronous cancer in the first 2 to 3 postoperative years[13]. However, two types of metachronous cancer must be distinguished as suggested by Heald *et al*[20]. The lesion detected in the early postoperative period may be an overlooked synchronous lesion and thus should be differentiated from a genuine metachronous neoplasm found later. The reported mean time for a real metachronous cancer to develop is about 10 years. Therefore, once the entire colon has been inspected and all polyps found have been removed, a routine colonoscopy is not expected to detect metachronous cancers in the early postoperative years.

In conclusion, a preoperative colonoscopy should be performed for all colorectal cancer patients since the presence of synchronous lesions often alters the treatment plan. Intraoperative colonoscopy is a valid option when the preoperative evaluation is not possible due to bowel obstruction.

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